"The real advancement of science needs, as Lord Derby says, leisure, and the power and opportunity of purely disinterested study. In this sense all scientific men will agree with Lord Derby that science needs more help. We have, indeed, in England, some very illustrious living examples of men who not only teach, as a daily and laborious duty, the methods and results of scientific investigation, but who have themselves, in a precious and hard-earned leisure, carried that investigation far forward along paths hitherto untrodden. But it has occurred to every reader of their writings to ask what they might have added to the world's knowledge had they been able to devote their whole time and strength to their favourite pursuit. There is a growing conviction that investigation of this kind, as apart from teaching, ought to be encouraged by the State. Lord Derby would not grudge it help, even from national resources; but he throws out a suggestion which may be commended to the notice of men who, like the late member for Bridport, have money to leave, and are on the look-out for heirs. We have, as Lord Derby says, bequests of all kinds; and it would be a welcome sign that science had been made popular, even in a sense he would approve, if bequests of large sums to endow original research should come into fashion."

The *Daily Telegraph* says:—

"And here the speaker could not but touch on the question of the better endowment of scientific research, which he disposed of by heartily wishing that such benevolent people as give half a million to a charity, or to the Kirk of Scotland, would turn the stream of Pactolus upon the dry ground of natural science. There is no soil which would yield back more profitable harvests. A discovery in mechanics or physics benefits all mankind; and great investigations are undoubtedly kept in abeyance for want of the help which society does not, and the Government cannot, bestow. Lord Derby, indeed, expressed himself willing to advocate all that could be done in this direction by a Government; but his opinion is that the community must take up the question, if anything really large was to be hoped for, though something might, perhaps, be effected by the careful application of old endowments, upon which point the Lord Rector uttered some observations balanced so finely that a pinch of the dust of a 'dead founder' would turn his well-trimmed scales."

The *Globe* speaks as follows:—

"Valuable as were the hints suggested on what may be described as the conduct of intellectual life, still greater interest attaches to Lord Derby's observations on the subject of scientific research and University Reform. On the former topic scientific men have sometimes talked rather wildly of late, as if it were the duty of the State to provide an elaborate scheme for the endowment of science. Lord Derby did not accept this view; but he distinctly laid it down that the community has not yet realised the vastness of its obligations to science, and that, when it does so, much larger funds will be devoted to its encouragement than are now available. He also declared that, for his own part, he would not object to the State doing something to foster original research. These utterances will be eagerly fastened on by scientific men, but it may perhaps be questioned whether the difficulties in the way of definite action are not somewhat underrated. By what test would it be possible to select the men who should be supported for the purpose of extending the bounds of science? And if this difficulty were overcome, how could an assurance be given that the opportunities secured would be applied to the best advantage? Would it not be necessary to associate duties with the rights conferred on successful candidates? These and other obstacles may not be insuperable; but they will have to be thoroughly considered before a large additional expenditure is undertaken on behalf of science. Perhaps the best solution would be a generous endowment of scientific professorships—by private liberality, if possible—in connection with which there would be teaching to some slight extent, but not so much as would interfere with work of a high kind."

According to the *Hour*—

"Perhaps that which will seem to English readers the most important part of Lord Derby's address is that relative to the importance of scientific research."

The *Scotsman* has the following:—

"Lord Derby does not know much about science, but he knows enough to have a clear view of the truth that 'science, in the strict sense of the word, can never be popular.' He also sees plainly enough that, as a consequence of this, science as a pursuit can never pay. Nothing in his address is more important or more just than his plea for the endowment of science, coupled as it is with an expresson of his individual willingness that some aid should be given to science by the State. It is plain, too, that Lord Derby thinks that something might be got from our older endowments for this object, without doing injustice to anyone, living or dead."

The *Glasgow Herald* thus writes:—

"Scientific culture seems to command the largest share of Lord Derby's sympathies. Those who have the taste for the investigation of material objects 'have the satisfaction of knowing that while satisfying one of the deepest wants of their own nature, they are at the same time promoting, in the most effectual manner, the interests of mankind.' There is, in other words, the investigation of the unknown, and a service of utility rendered to mankind. Then, the charm of scientific studies to Lord Derby lies in their definiteness. The student is held down to the facts of nature; if he investigates them at all he must investigate them thoroughly. He knows nothing till he knows all that the facts reveal. Popular science is, to his mind, a misnomer. Science can never be popular, for its study involves leisure, careful industry, and patient waiting and watching. He is so convinced of the advantages of cultivating the study of nature that he would not be averse to a Government endowment."

It will thus be seen that public opinion, so far as we at present have been able to glean it, approves of the views expressed by Lord Derby; we cannot therefore doubt that Government will take an early opportunity of giving them practical effect.

AFRICAN HANDIWORK

Artes Africanae. By Dr. Georg Schweinfurth. With twenty-one lithographic plates. (London: Sampson Low and Co., 1875.)

THE title of this work may perhaps be thought too comprehensive, the author having, wisely as we think, confined himself to the arts of the negro tribes visited by him in the vicinity of the White Nile between the equator and about 12° north latitude.

Africa may be divided into three regions, corresponding to the movements of trade. In the northern half of the continent where Islamism and firearms have penetrated, home-made goods have been supplanted by European commodities and the last traces of native industry threaten shortly to disappear. An intermediate zone in which the cotton stuffs of Europe are made the chief articles of trade intervenes between this and the interior, where European goods are unknown and native arts are found in their most primitive condition. It is to a portion of this latter region that Dr. Schweinfurth's work relates.

The tribes of the White Nile were first visited by Consul Petherick in 1857-8, and many specimens of their arts which were brought home by him have since been

dispersed. A considerable number have, however, since found their way either into the Christy collection, or into Col. Lane Fox's Anthropological collection at Bethnal Green, and have been described in greater or less detail. But with the exception of a brief account of the war weapons of this people which was contributed by Mr. Petherick to the *Journal of the United Service Institution* in 1860, including numerous illustrations, no original account of their native arts has been published until the appearance of the present work.

The tribes referred to in this volume are named Dinka, Dyur, Bongo, Mittu, Niam Niam, Bellanda, Monbuttu, Sere, and Kred, and as a rule the same types of art with innumerable but closely-allied varieties pervade the whole of them. Imitation of natural forms, that invariable characteristic of primitive arts, is not less frequent here than amongst other savages; thus we find amongst the Bongo, bells and rattles in imitation of leguminous fruits, and iron thorns upon the heads of spears, both named and copied from the Makrigga, a thorny shrub of the district which no doubt was used and served as a model for these barbarous weapons before the introduction of iron. Notwithstanding the prevalence of iron, the Mittu and some other tribes still employ an arrow with a hard wood point or fire-shaft in preference to the iron ones, which carry only one-third the distance although with greater accuracy of flight.

The partiality for doubling certain objects without in most cases the least practicable utility being perceptible is noticed by the traveller as a characteristic of Central African art. Thus we find double points to roofs, double pipe-bowls, double lance-heads, double spoons, and double bells included amongst the objects illustrated. The art of the carpenter, as with most savages, appears to be confined to carving household utensils such as seats, tables, dishes, boxes, mortars, musical instruments, canoes, &c., out of a solid block; the joiner's art seems almost unknown, the only exception here recorded being a sleeping-bench of the Monbuttu tribe, in which the framework of Raphia stalks is fastened to the feet by pegs of hard wood. One of those curious transformations so common in savage art is seen in the case of the broad mushroom-headed club, "Bollong." This club has been described by Mr. Petherick, amongst the Dor tribe, as a weapon for cracking skulls. The broad head, which is obviously a monstrous development of the ordinary club head, appears to have suggested its employment as a seat by sticking the pointed handle into the ground and sitting on the head. Accordingly we find that amongst the Dinka, Dyoor, Madi, and Gani, the upper surface of the head has been made perfectly flat, in order to adapt it to this new use, whilst at the same time preserving its efficiency as a weapon. The wooden parrying-stick or shield, "Kwrr," constructed of one piece with a hollow for the hand carved out in the centre, has been noticed by Mr. Petherick amongst the Mundo, and is here figured as a Dinka weapon. Its close resemblance to the Australian parrying-shield, Tamarang, and to one from an Egyptian tomb, now in the Louvre at Paris, has been noticed by Col. Lane Fox in his catalogue of his collection at Bethnal Green. Dr. Schweinfurth compares it to a specimen from the Pacific Isles now in the Berlin Museum. Should this turn out to be correct, and not a mistaken locality, it will add another link to the area of distribution of this peculiar form of weapon. Parrying-sticks, without the hand hole, are undoubtedly employed in some of the Pacific Isles. The bow-shaped parrying-shield, "Dang," represented by Mr. Petherick, now in the Bethnal Green collection without a string, is here represented with a string attached, showing that although now used exclusively as a parrying weapon, it was without doubt derived from the bow, which it resembles, and that the curved ends have been retained for a totally different use from that which they served originally. The identity of this weapon with a Caffre implement figured in Wood's "Africa" is, however, doubtful, as it appears not unlikely the latter may be a musical instrument.

Several illustrations are given of the peculiar iron boomerang of the Niam Niam, here called "Pingah," but known as "Hunga Munga," or "Shanger Mangor," by the Musgu of Soudan, and Kulbeda in Upper Sennaar. The distribution of this class of weapon and its varieties has been traced by Col. Fox in his catalogue, where it is shown to be common to the greater part of the black races of mankind, including the Australians and the aborigines of Central India; but we have here some additional points of interest in connection with the African variety. We now learn from Dr. Schweinfurth that, like the Australian weapon, it is thrown by the Niam Niam, so as to rotate in a horizontal plane, which, though anticipated, has not been distinctly stated by former travellers. We learn also from this work that the wooden variety of this weapon, called "Trumbash," a name which is sometimes also applied to the iron variety, and which was first noticed by Sir Samuel Baker in Abyssinia, is in use amongst the Mohammedan negro tribes throughout the district between that country and Lake Tsad. This weapon, described as a flat two-edged projectile of wood, curved more or less sickle-like, and wider towards the point, is undoubtedly the original of the whole class, and from its resemblance to the Dravidian and Australian forms of it, affords one of several links which connect the arts of those black races of the southern hemisphere, which are supposed by Prof. Huxley, and by Prof. Haeckel after him, to have been derived from a now submerged paradise in the Indian Ocean.

To our knowledge of the iron-work of these tribes Dr. Schweinfurth also adds some important details, but it is remarkable that he should not have especially noticed the peculiar ogee-sectioned blade, sunk on alternate faces, which is such a characteristic feature of the iron implements of all Africa, from the Caffres on the south-east to the Fans on the west, and which, like the double bellows, connect them with the iron-workers of Sudia and Burmah. It is true that illustrations of this peculiar blade, so far as the shading enables us to judge, are given in the plate of Niam Niam spear-heads, but without comment. They are absent in the plate of Bongo spear-heads, and it would be interesting to know whether this is an accidental omission, or whether the Bongo form is in this respect an exception to the custom prevalent amongst other tribes of iron-workers.

The plates are well executed, and though not furnished with a scale, as is desirable in such works, the dimensions are given in most cases.

It might be suggested as an improvement to future travellers, that in the arrangement of the plates more attention should be paid to varieties, and that the several forms should be placed side by side according to their affinities. There is no point of so great interest to the scientific student of early culture as the allied varieties of form. As a rule with exceptions, it may be said that arts which are indigenous present greater varieties than those which are exotic, and hence the importance of studying minute differences, more especially in cases where, by means of gradual variation, transitions to other types or other uses may be traced. A few finished drawings are no doubt valuable in order to give a correct idea of the leading types; but for the varieties, outline drawings on a smaller scale in the style of the illustrations of "Demmin's History of Arms," are all that is needed, and enable these transitions to be given at a trifling cost. With these additions, and with due attention to such other matters relating to savage art as are suggested in the "Anthropological Notes and Queries," published by the British Association, we would earnestly commend the example of Dr. Schweinfurth to all travellers, for, as he truly says in his preface, "Hurry is needed: the destructive tendency of our industrial productions obtruding themselves upon all the nations of the earth menaces, sooner or later, to sweep away, even in Africa, the last remnants of indigenous arts." Of the utility of such a work as this no anthropologist or antiquary can doubt. There is, however, one remark of the author's to which we would draw special attention, and which he in this work reiterates with commendable emphasis :—"A people, as long as they are on the lowest step of their development, are far better characterised by their industrial products than they are either by their habits, which may be purely local, or by their own representations, which, rendered in their rude and unformed language, are often incorrectly interpreted by ourselves. If we possessed more of these tokens we should be in a position to comprehend better than we do the primitive condition of many a nation that has now reached a high degree of culture."

RECENT FRENCH EXPERIMENTAL PHYSIOLOGY

Physiologie Experimentale. Travaux du Laboratoire de M. Marey. (Paris: G. Masson, 1876.)

UNDER the auspices of the Minister of Public Instruction of France are published from time to time volumes of the "Bibliothèque des Hautes Études." The work before us is one of these, and its value will be fully appreciated by any physiologist or physicist who has once glanced at its well illustrated pages. It contains several papers by M. Marey, mostly on points connected with the employment of the "graphic" method of depicting the magnitude and duration of dynamical phenomena both physical and physiological, and two by Dr. François-Franck on the anatomy and physiology of the vascular nerves of the head.

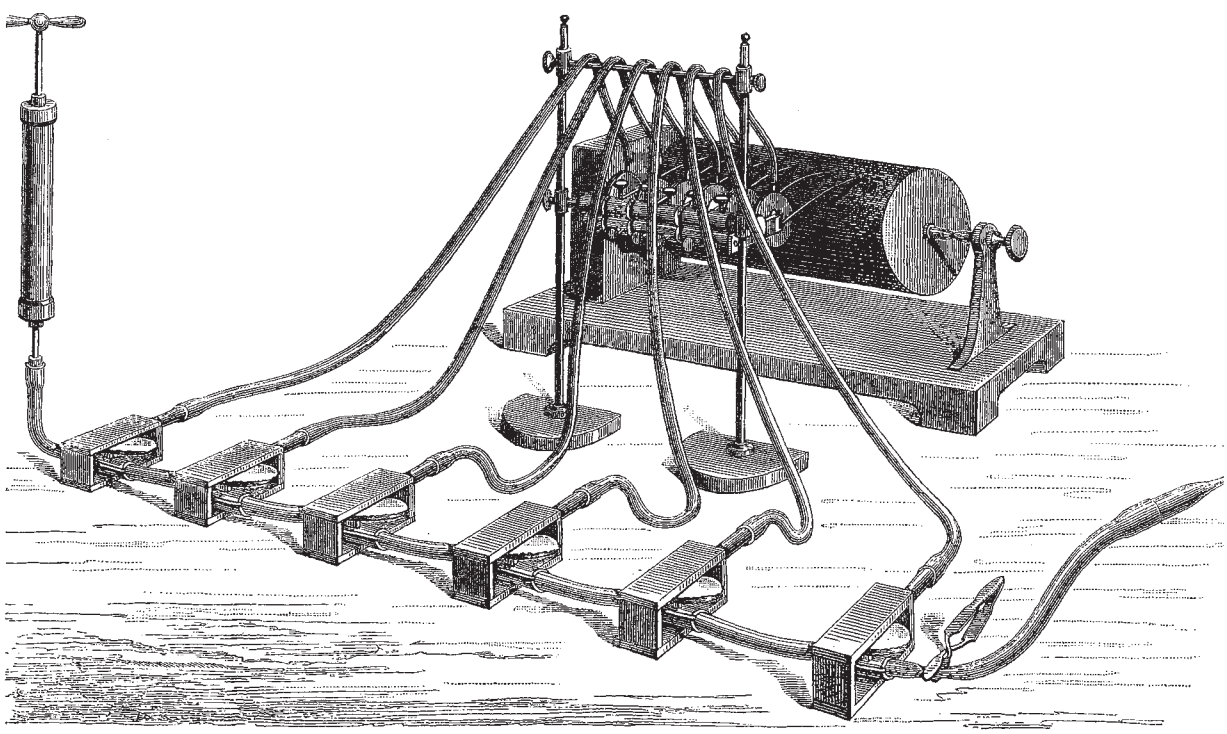

FIG. 1.

The most important of the memoirs by M. Marey is, in our estimation, that on "the movements of liquid waves, undertaken with a view of assisting in the theory of the pulse." Of this we will give a short account on the present occasion.

M. Marey's extraordinary mechanical skill has enabled him to devise and construct an apparatus by means of which he has been enabled to represent synchronously,